



## Exploring depression and problematic internet use among college females: A multisite study



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### ABSTRACT

**Objective:** The purpose of this study was to assess associations between depression and problematic internet use (PIU) among female college students, and determine whether Internet use time moderates this relationship.

**Method:** This cross-sectional survey included 265 female college students from four U.S. universities. Students completed the Patient Health Questionnaire-9 (PHQ-9), the Problematic and Risky Internet Use Screening Scale (PRIUSS) and self-reported daily Internet use. Analyses included multivariate analysis of variance and Poisson regression.

**Results:** Participants reported mean age of 20.2 years (SD = 1.7) and were 84.9% Caucasian. The mean PHQ-9 score was 5.4 (SD = 4.6); the mean PRIUSS score was 16.4 (SD = 11.1). Participants' risk for PIU increased by 27% with each additional 30 min spent online using a computer (RR = 1.27, 95% CI: 1.14–1.42,  $p < .0001$ ). Risk for PIU was significantly increased among those who met criteria for severe depression (RR = 8.16 95% CI: 4.27–15.6,  $p < .0001$ ). The PHQ-9 items describing trouble concentrating, psychomotor dysregulation and suicidal ideation were most strongly associated with PIU risk.

**Conclusions:** The positive relationship between depression and PIU among female college students supports screening for both conditions, particularly among students reporting particular depression symptoms.

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## 1. Introduction

### 1.1. Depression and college students

Depression is one of the most common health issues impacting college students (Association, 2009; Gallagher, 2007; Hunt & Eisenberg, 2010; Zivin, Eisenberg, Gollust, & Golberstein, 2009). Depression often has an onset during the college years; the yearly incidence of major depressive disorder is approximately 8% (Eisenberg, Golberstein, & Gollust, 2007; Hunt & Eisenberg, 2010). Depression among college students is common and consequential as adverse outcomes include increased rates of substance use, co-morbid psychiatric conditions such as anxiety, and

suicide (Association, 2010; Association, 2013; Deas & Brown, 2006; Garlow et al., 2008; Hunt & Eisenberg, 2010; Kessler, Foster, Saunders, & Stang, 1995; Rao, 2006; Rao & Chen, 2009). Universities are important settings in which mental health concerns such as depression must be addressed given that approximately half of young adults attend post-secondary education (Statistics, 2010).

### 1.2. Problematic internet use

In recent years, concerns have been raised regarding links between depression and Problematic Internet use (PIU) (Ha et al., 2006; Ni, Yan, Chen, & Liu, 2009; van den Eijnden, Meerkerk, Vermulst, Spijkerman, & Engels, 2008; Yen, Ko, Yen, Wu, & Yang, 2007). PIU is an emerging concern within the adolescent and young adult population and is defined as "Internet use that is risky, excessive or impulsive in nature leading to adverse life consequences, specifically physical, emotional, social or functional impairment" (Moreno, Jelenchick, & Christakis, 2013a; Moreno, Jelenchick, & Christakis, 2013b). Prevalence of PIU among adolescents and young

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adults in the U.S. is estimated at 4–5% (Christakis, Moreno, Jelenchick, Myaing, & Zhou, 2011; Derbyshire et al., 2013; Liu, Desai, Krishnan-Sarin, Cavallo, & Potenza, 2011). Similar to other addictions, males have consistently been reported to suffer more commonly from PIU, but females remain an understudied population (Anderson, 2001; Morahan-Martin & Schumacher, 2000; Scherer, 1997).

Several factors place college students at particular risk for PIU. Young adults transitioning from secondary school to a university environment often struggle with affirming a sense of identity and forming new relationships; two important developmental tasks which can increase susceptibility to addictive behaviors (Kandell, 1998). Further, students experience a considerable increase in unsupervised time in college, and a coinciding rise in amount of time spent online (Verhoeven, Heerwegh, & De Wit, 2010). The majority of college students report spending at least two hours a day online, with the majority of time spent on social networking sites and academic pursuits (Moreno, Jelenchick, Koff, & Eickhoff, 2012; Moreno, Jelenchick, Koff, Eickhoff, et al., 2012). Males more frequently report using the Internet for entertainment purposes, checking sports scores, and downloading or streaming music and videos (Colley & Maltby, 2008; Jones, Johnson-Yale, Millermaier, & Pérez, 2009). In comparison, females are more likely to use the Internet to communicate socially and to maintain, renew, or form relationships; behaviors most commonly associated with social networking sites (SNSs) (Colley & Maltby, 2008; Pempek, Yermolayeva, & Calvert, 2009). Thus, males and females may have different risks for PIU based on how they use the internet, as well as how much they use it. Both frequency and degree of SNS use have been positively associated with PIU in adolescents and college students (Kim & Davis, 2009; van Rooij, Schoenmakers, van de Eijnden, & van de Mheen, 2010).

### 1.3. Depression and PIU

Previous work has begun to explore the relationship between depression and PIU. Depression's place in the etiology of PIU was first theorized by Davis (2001), who described a model in which existing psychopathology predisposes an individual to maladaptive Internet cognitions which subsequently lead to the development of PIU. A few studies have investigated cross-sectional assessments of PIU to determine associations with a variety of mental health concerns, including depression (Amorosi, Ruggieri, Franchi, & Masci, 2012; Dalbudak et al., 2013; Hawi, 2012; Park, Hong, Park, Ha, & Yoo, 2013). One previous study of Turkish university students found that alexithymia was positively associated with PIU (Dalbudak et al., 2013), while a study of Korean adolescents found that depression symptoms predicted PIU (Park et al., 2013).

#### 1.3.1. Gaps in the literature

At present, several gaps exist in understanding the relationship between depression and PIU. First, most studies have focused on severity of PIU as a risk for other illnesses; studies that focus on a population known to be at risk for depression and assess risk of PIU are needed. Second, most studies have taken place outside of the U.S.; as rates of Smartphone and SNS use among U.S. adolescents and young adults continue to escalate, an understanding of this population is needed (Lenhart, Purcell, Smith, & Zickuhr, 2010; Smith, 2013; Smith, Lee, & Zickuhr, 2011). Finally, a relationship between Internet use and depression among college students has been proposed (Moreno, Jelenchick, Koff, & Eickhoff, 2012). The effects of controlling for an individual's level of Internet use on the association between depression and PIU has been unexplored. Addressing these gaps is critical toward development of

evidence-based recommendations for college students with depression regarding their Internet use toward prevention of PIU.

### 1.4. Study purpose and hypotheses

Thus, the purpose of this multisite study was to explore the relationship between depression symptoms, PIU and Internet use, particularly among participants reporting severe depression symptoms. We chose to focus this study on college students, given their high rates of both depression and Internet use, and understand these relationships across four diverse university settings (Smith et al., 2011). We chose to focus this study on females given they have higher rates of depression compared to males, and remain an understudied population in PIU (Furr, Westefeld, McConnell, & Jenkins, 2001; Garlow et al., 2008). Our goal was to recruit female college students with diverse interests and backgrounds, thus we recruited across four campuses and different classroom settings.

#### 1.4.1. Association between internet use and health concerns: depression and PIU

Our first research question (RQ1) was to assess relationships between internet use and both depression and PIU risk. Based on previous studies, we hypothesized that increased internet use time would be associated with depression (Moreno, Jelenchick, Koff, & Eickhoff, 2012; Moreno, Jelenchick, Koff, Eickhoff, et al., 2012), as well as PIU (Hawi, 2012).

#### 1.4.2. Association between depression and PIU

Our second research question was to determine associations between depression and PIU risk, particularly among participants reporting severe depression symptoms (RQ2). Previous work supports that college students who disclose depression symptoms on the internet were more likely to meet criteria for mild depression (Moreno, Christakis et al., 2012; Moreno, Jelenchick, Koff, & Eickhoff, 2012; Moreno, Jelenchick, Koff, Eickhoff, et al., 2012). Thus, we hypothesized that after controlling for Internet use, the relationship between PIU and depression would be driven by an overlap of mild depression symptoms with PIU.

#### 1.4.3. Association between specific depression symptoms and PIU risk

Our third research question was which specific depression symptoms were associated with PIU (RQ3). Previous work suggests that PIU may include somatic symptoms such as difficulty sleeping (Moreno et al., 2013a; Moreno et al., 2013b). Thus, we hypothesized that the somatic symptoms that co-occur between depression and PIU, such as difficulty sleeping and concentrating, would predict the highest risk for PIU.

#### 1.4.4. Depression symptoms and PIU subscales

Our final research question was whether there were differences in PIU subscale scores between depressed and non-depressed college females (RQ4). We hypothesized that depressed individuals, who are a greater risk for emotional dysregulation (Richardson et al., 2010), would report greater symptoms of emotional impairment related to PIU.

## 2. Materials and methods

### 2.1. Setting

Undergraduate females from four universities in the Midwest and Western U.S. were recruited. These four universities were selected to represent different school settings; the schools included three state universities and one private college. One school was in an urban setting and three of the schools were in mid-sized towns.

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